Erratum: Next-to-Leading-Order QCD Corrections to Higgs Boson Plus Jet Production with Full Top-Quark Mass Dependence [Phys. Rev. Lett. 120, 162001 (2018)]

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We have discovered two errors in the calculation of our Letter (see Ref. [1]). In the real-radiation contributions the scale of the infrared subtraction terms was not set correctly and when setting the virtual contributions to 0 in POWHEG-BOX-V2 to add them separately, also some of the subtraction terms were set to 0.

These errors affect all next-to-leading-order (NLO) results for the Higgs effective field theory (HEFT), $\mathrm{FT}_{\mathrm{approx}}$ and the full theory, both differentially and at total cross section level. The corrected values for the total cross sections at NLO are reported in Table I. Updated versions of Figs. 1 and 2 are provided here.

TABLE I. Total cross sections at LO and NLO in the HEFT and $\mathrm{FT}_{\mathrm{approx}}$ approximations and with full top-quark mass dependence. The upper and lower values due to scale variation are also shown. More details can be found in the text.

Theory	LO [pb]	NLO [pb]
HEFT:	$\sigma_{\mathrm{LO}} = 8.22^{+3.17}_{-2.15}$	$\sigma_{\mathrm{NLO}} = 13.53^{+2.19}_{-2.04}$
$\mathrm{FT}_{\mathrm{approx}}$:	$\sigma_{\mathrm{LO}} = 8.57^{+3.31}_{-2.24}$	$\sigma_{\mathrm{NLO}} = 14.06^{+2.17}_{-2.25}$
Full:	$\sigma_{\mathrm{LO}} = 8.57^{+3.31}_{-2.24}$	$\sigma_{\mathrm{NLO}} = 14.19(7)^{+2.29}_{-2.23}$

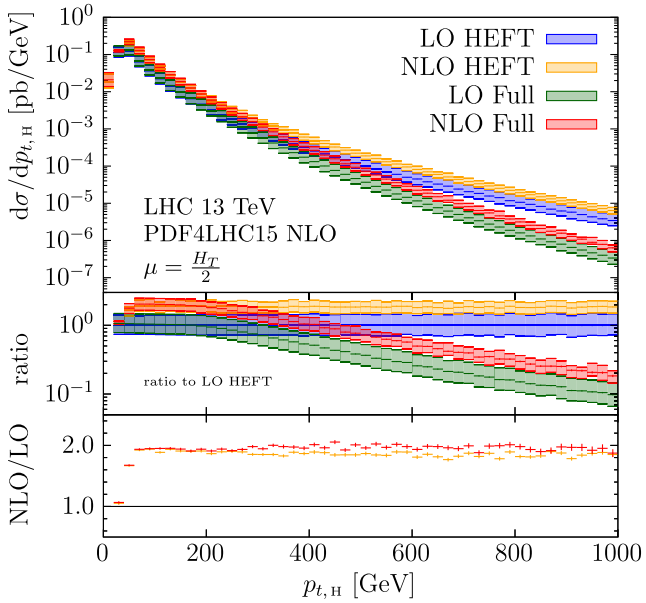

FIG. 1. Higgs boson transverse momentum spectrum at LO and NLO in QCD in HEFT and with full top-quark mass dependence. The upper panel shows the differential cross sections; in the middle panel we normalize all distributions to the LO HEFT prediction and in the lower panel we show the differential K factors for both the HEFT and the full theory distributions. More details can be found in the text.

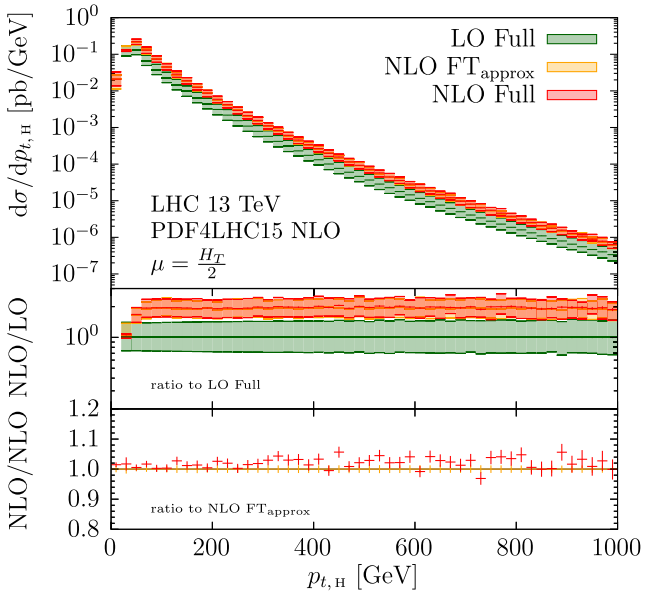

FIG. 2. Higgs boson transverse momentum spectrum at LO and NLO in QCD with full top-quark mass dependence compared with the NLO predictions in $\text{FT}_{\text{approx}}$. The upper panel shows the differential cross sections; in the middle panel we normalize all distributions to the LO prediction and in the lower panel we show the differential ratio between the NLO $\text{FT}_{\text{approx}}$ predictions and the full theory ones. More details can be found in the text.

The new results also somewhat alter our discussion and conclusions as follows: (i) While at LO the top-quark mass effects lead to an increase of 4.3%, at NLO they increase the total cross section by 4.9% when compared to the HEFT approximation and 1% when compared to $\text{FT}_{\text{approx}}$. (ii) The curves in the lowest panel of Fig. 1 show the differential K factor in the HEFT and in the full theory. In both cases above 150 GeV they become very stable and amount to about 1.85 and 1.95, respectively. (iii) The scale uncertainty band of the full theory prediction is not significantly reduced compared to $\text{FT}_{\text{approx}}$. (iv) The full NLO prediction shows an increase at the 1%–2% level compared to the $\text{FT}_{\text{approx}}$ prediction.

Our conclusion should be altered as follows: (i) Compared to $\text{FT}_{\text{approx}}$ predictions, the full two-loop contribution enhances the NLO predictions by about 1% at the level of the total cross section and with nearly no dependence on the transverse momentum of the Higgs boson. (ii) Despite a completely different p_t scaling, the K factors in the HEFT and in the full theory behave in a very similar way.

We thank Xuan Chen for detailed cross checks of the real radiation contributions.

[1] X. Chen, A. Huss, S. P. Jones, M. Kerner, J. N. Lang, J. M. Lindert, and H. Zhang, Top-quark mass effects in H + jet and H + 2 jets production, arXiv:2110.06953.